THE DESIGN OF SPIDER-WEB FOUNDATION IN THE SUNAN HOTEL SOLO

Submitted as partial for filling the requirement for bachelor degree of Civil Engineering Program Engineering Faculty

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UNIVERSITAS MUHAMMADIYAH SURAKARTA

2017

APPROVAL PAGE

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SCIENTIFIC PUBLICATIONS

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Abstract

The construction spider-web foundation is a combination of a flat plate concrete slab foundation system using soil improvement system. This soil improvement system can utilize the soil as part of the foundation structure. In this study the construction spider-web foundation was applied to The sunan hotel located at Jl. Ahmad Yani no. 40 Solo that using bored pile foundation in its development, this research aim to design the building of The sunan hotel by using foundation of spider-web construction. This analysis begins by calculating the calculation of bearing capacity by using N-SPT data, then calculating the maximum soil pressure, settlement , equivalent thickness, and the dimensions and reinforcement. In the calculation of the settlement only calculated the immediate settlement due to soil conditions is sand silty so there is no consolidation settlement. The results obtained from this analysis are the bearing capacity value of 35.91 t / m2, the maximum soil pressure (qmax) of 11.14 t / m2, a immediate settlement of 11.63 cm. High rib construction 140 cm with diameter of reinforcement 1.9 cm, and for high rib settelement is 175 cm with diameter of reinforcement 1.9 cm.

Key Word : Bearing Capacity, Construction Spider-Web, Settlement.

Abstrak

Pondasi konstruksi sarang laba-laba merupakan kombinasi dari sistem pondasi pelat beton pipih menerus dengan menggunakan sistem perbaikan tanah. Sistem perbaikan tanah ini secara spesifik dapat memanfaatkan tanah sebagai bagian dari struktur pondasi. Dalam penelitian ini pondasi konstruksi sarang laba-laba di terapkan pada The sunan hotel yang berlokasi di Jl. Ahmad Yani No. 40 Solo yang menggunakan pondasi bored pile pada pembangunannya , penelitian ini bertujuan untuk mendesign bangunan The sunan hotel dengan menggunakan pondasi konstruksi sarang laba-laba. Analisis ini dimulai dengan menghitung perhitungan daya dukung dengan menggunakan data N-SPT, kemudian menghitung tegangan tanah maksimum, penurunan, ketebalan ekuivalen, dan dimensi dan tulangan. Pada perhitungan penurunan hanya dihitung penurunan langsung karena kondisi tanah dalam keadaan pasir berlanau sehingga tidak terjadi penurunan konsolidasi. Hasil yang didapatkan dari analisis ini adalah nilai daya dukung sebesar 35,91 t / m^2, tegangan tanah maksimum (qmax) sebesar 11,14 t / m^2, penurunan langsung 11,63 cm. Tinggi rib konstruksi 140 cm dengan diameter tulangan 1,9 cm, dan untuk tinggi rib penurunan adalah 175 cm dengan diameter tulangan 1,9 cm.

Kata Kunci : Daya dukung, Konstruksi sarang laba-laba, Penurunan.

1. INTRODUCTION

The first step to do for building construction is the foundation work. The foundation is a very important part for a building, because the foundations that sustain and withstand the whole load acting thereon. Foundation design depends on the type of soil and the type of structure to be built upon. So that type of foundation will be built must be adapted to the conditions and the properties of the soil where the foundation was built.

The shape of the foundation can be determined by knowing the weight of the building or the number of floors to be built and the state of the soil around the building, while the depth of the foundation is determined by where the soil solid support foundation. The type of foundation is divided into two shallow foundation and deep foundation. Shallow foundation is usually made close to the soil surface and can go ahead and spread the load to the ground like a spider's web foundation, footing and foundation raft. Deep foundations is the foundation that can forward the load to the hard ground or gravel as pile foundation and foundation caissons.

The Sunan Hotel Solo using bored pile foundation where these foundations include the type of shallow foundation. In this case the author tries to analyze building of the sunan hotel solo with spider-web foundation. So the purpose of this paper is to calculate the bearing capacity of foundation and to plan the calculation on the sunan hotel solo using spider-web foundation.

2. RESEARCH METHOD

2.1.1 Calculation of Spider-Web Foundation

Soil bearing capacity is the ability of soil to support the load in terms of both structure and foundation of the building on it without any shear failure. For spider-web foundation, estimated capacity of bearing capacity is determined based on the formula :

qu = $\frac{q_c}{20}$. Kd

qa = 1,5 . qa (raft foundation)

2.1.2 Equivalent thickness of construction spider-web

y = $\frac{\pi R t^2 + 4b(h_{k^2} - t^2}{2\pi R t + 8b(h_k - t)}$

Ix = $\frac{1}{12}(2\pi R)(t_{e^3})$

$t_e = \sqrt[3]{\frac{12\ .\ Ix}{2\pi R}}$

2.1.3 Calculation of maximum soil pressure

$qo = R\left[\frac{1}{A} \pm \frac{ex}{Iy} \pm \frac{ey}{Ix}\right]$ or $qo = \left[\frac{R}{A} \pm \frac{My.x}{Iy} \pm \frac{Mx.x}{Ix}\right]$

2.1.4 Calculation of Settlement

$Si = q. B \frac{1-\mu^2}{E_s} . I_w$

3. ANALYSIS AND DISCUSSION

From the analysis obtained the following results:

Table V. 2 The results of the calculation of the analysis in this chapter

Bearing Capacity (q_a)	35,91	t/m^2
Maximum soil pressure	11,14	t/m^2
Immediately settlement	11,63	cm
High rib construction	140	cm
Ø Reinforcement rib construction	1,9	cm
High rib settlement	175	cm
Ø Reinforcement rib settlement	1,9	cm

4. CONCLUSION AND SUGGESTION

4.1 Conclusions

From the results of calculations and analysis spider-web foundation in the building The sunan hotel in Solo, it can be concluded as follows:

4.1.1 The result calculation of soil bearing capacity is obtained (q_a) 35,91 t/m^2 .

4.1.2 Results from the calculation the maximum soil pressure is obtained at 11,14 t/m^2.

4.1.3 Equivalent thickness :

Thick equivalents obtained from analysis calculations get different results in, because there is a high difference in the value of hk. For rib construction use hk = 200 cm and for rib settlement hk = 250 cm.

a) Rib constructions (te) = 140 cm

b) Rib settlement (te) = 175 cm

The high difference of rib construction with rib settlement makes the soil improvement inside construction spider-web has permanent stability, besides rib settlement also provides protection against soil improvement in rib-rib.

4.1.5 The result of the settlement calculation for the immediate settlement is 11,63 cm.

4.1.6 Dimensions and reinforcement of rib construction and rib settlement, is shown in the figure below :

- Rib construction

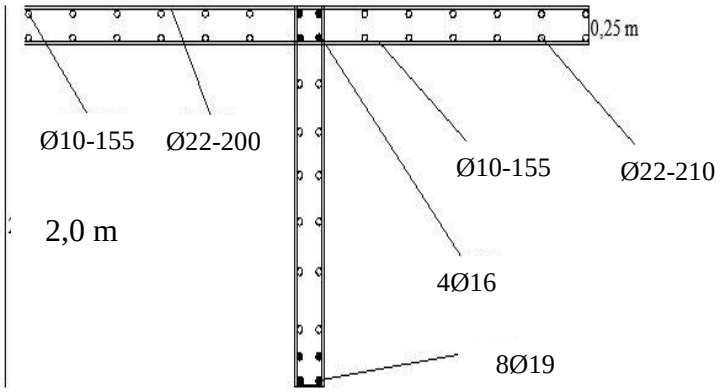

Figure 4.1 Dimension and reinforcement of rib construction.

- Rib Settlement

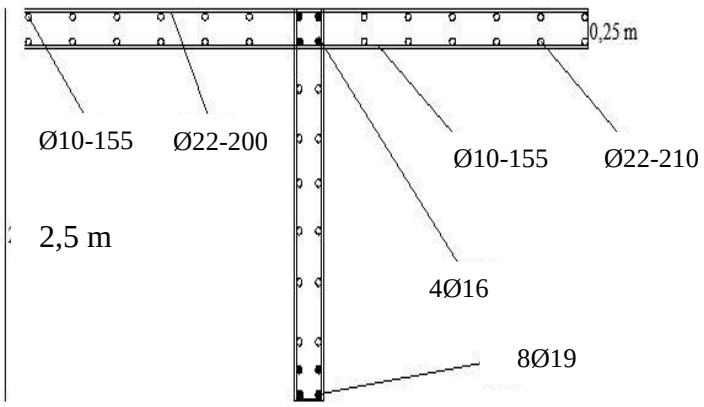

Figure 4.2 Dimension and reinforcement of rib settlement.

4.2 Suggestions

From the results of the analysis of this final task then given some suggestions as follows:

4.2.1 For analyze manually required accuracy and understanding in determining the formula approach to be used.

4.2.2 For medium-rise buildings (3 - 8 floors) can be recommended using the construction spider-web foundation as one of the foundation alternatives.

4.2.3 Construction spider-web foundation is not recommended for building which has a height of more than 10 floors because it has a very large settlement value in a short time depend on the weight of the building and the soil conditions .

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